Approach to the Patient with Affection and Disease of the Musculoskeletal System and Connective Tissue

LECTURE IN INTERNAL MEDICINE PROPAEDEUTICS

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Plan of the lecture

Approach to the Patient
with Affection and Disease of the musculoskeletal system
and connective tissue

- Musculoskeletal disorders and Connective tissue diseases definitions
- Interviewing of the patient
- Physical examination of the patient
- Instrumental methods
- Laboratory methods

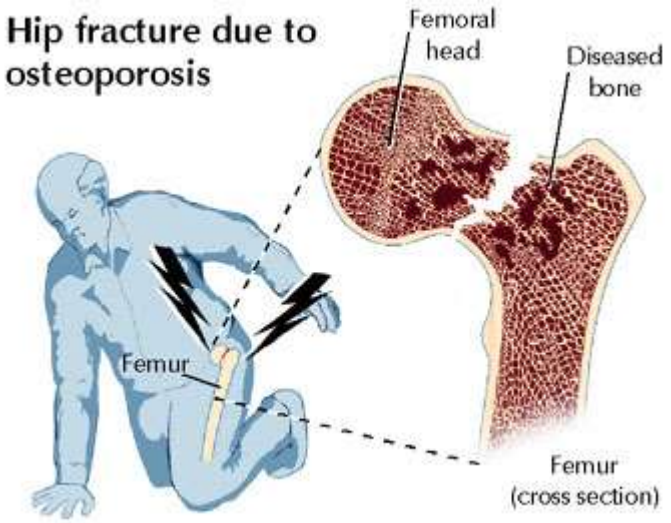
http://www.karpasia-hp.com/l/images/muscleskeleton.jpg

Musculoskeletal disorders definition

Musculoskeletal disorders (MSDs) are injuries or pain in the body's joints, ligaments, muscles, nerves, tendons, and structures that support limbs, neck and back

MSDs are degenerative diseases and inflammatory conditions that cause pain and impair normal activities

They can affect many different parts of the body including upper and lower back, neck, shoulders and extremities (arms, legs, feet, and hands)



http://www.hughston.com/Userfiles/hha/b_14_3_5.jpg https://en.wikipedia.org/wiki/Musculoskeletal_disorder

Connective tissue diseases definition

- A connective tissue disease is any disease that has the connective tissues of the body as a target of pathology
- Diseases in which inflammation or weakness of collagen tends to occur are also referred to as collagen diseases
- Connective tissue diseases can have strong or weak inheritance risks, and can also be caused by environmental factors

Marfan syndrome

http://doctordecides.com/marfan-syndrome/ https://en.wikipedia.org/wiki/Connective_tissue_disease

Interviewing of the patient: four overlapping processes

1. *engaging* (connecting with patients and establishing a good working relationship)
2. *focusing* (agreeing on the target of motivational enhancement and directing the conversation toward it)
3. *evoking* (drawing out the patients' own motivations for changing the target behavior)
4. *planning* (developing commitment to change and formulating a specific plan of action)

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3608718/ https://med.uc.edu/images/default-source/Medical-Education/medstudenta.jpg?sfvrsn=2

Interviewing of the patient: Good questions to get started on the core interview

Communication skills:

- Active listening
- Empathy
- Building rapport
- Open-ended questions
- Leading questions
- Silence
- “Why” questions
- Nonverbal communication cues

http://education.healthcaresource.com/wp-content/uploads/2011/12/shutterstock_70326385-resized-600.jpg http://samples.jbpub.com/9781449652722/9781449645106_CH01_001_036.pdf

Interviewing of the patient: Good questions to get started on the core interview

- What is your chief complaint?
- Tell me why you're here today
- Tell me about your injury
- What can I do to help you?
- Explain to me your understanding of your injury

http://www.twohavefun.com/wp-content/uploads/2015/03/how-to-improve-communication-skills.png
http://yabluchanskiy.com/klinicheskaya-praktika/approach-to-the-patient-with-disease-of-the-cardiovascular-system-podxod-k-pacientu-s-zabolevaniem-serdechno-sosudistoj-sistemy/

Interviewing of the patient: Patient profile

- Age
- Sex
- Race/Ethnicity
- Handedness
- Ht-Wt-BMI-Body type
- Primary language
- Barriers to learning
- Learning preference
- Unique rehabilitation goals

http://e-consultmydoctor.com/wp-content/uploads/2013/09/Doctor-Profile.png

http://yabluchanskiy.com/klinicheskaya-praktika/approach-to-the-patient-with-disease-of-the-cardiovascular-system-podxod-k-pacientu-s-zabolevaniem-serdechno-sosudistoj-sistemy/

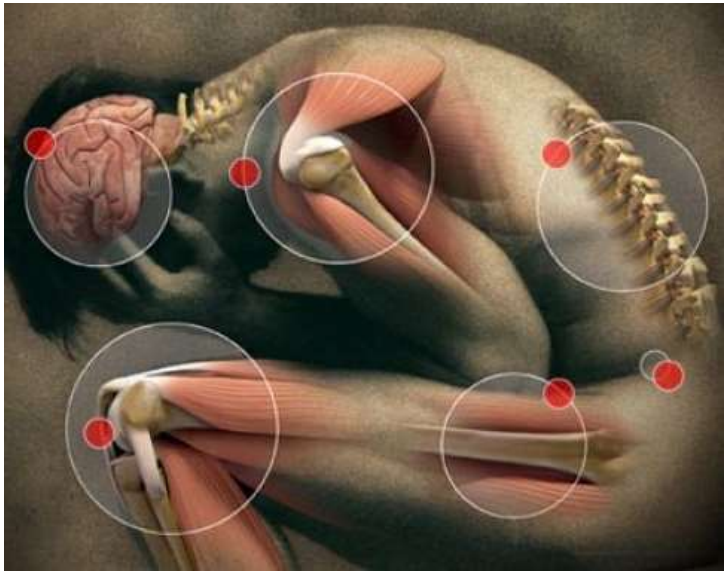
Interviewing of the patient: complaints

- Pain (arthralgia, myalgia, bone pain etc.)
- Joint stiffness
- Joint swelling (synovial hypertrophy +/- effusion)
- Deformity
- Ankylosis
- Muscle weakness
- Limited range of motion
- Bone fractures
- A butterfly-shaped rash on the cheeks and bridge of the nose
- Sensitivity to sunlight
- Hair loss
- Malaise
- Cold and numb fingers or toes (Raynaud's phenomenon)
- Swollen fingers or hands
- Rash
- Shortness of breath
- Fever
- Paleness , fatigue due to anemia
- Weight loss

https://en.wikipedia.org/wiki/Connective_tissue_disease https://en.wikipedia.org/wiki/Musculoskeletal_disorder

Interviewing of the patient: complaints (arthralgia)

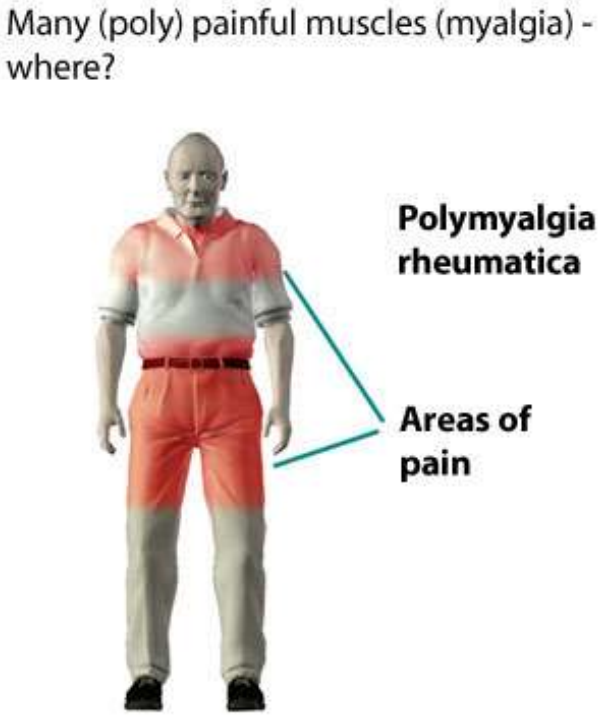
- Arthralgia literally means joint pain
- Arthralgia is a symptom of injury, infection, illnesses (in particular arthritis) or an allergic reaction to medication
- According to Medical Subject Headings (MeSH), the term "arthralgia" should only be used when the condition is non-inflammatory, and the term "arthritis" should be used when the condition is inflammatory



http://detadoctor.com/wp-content/uploads/2013/06/1.jpg https://en.wikipedia.org/wiki/Medical_Subject_Headings https://en.wikipedia.org/wiki/Arthralgia

Interviewing of the patient: complaints (myalgia)

- Myalgia, or muscle pain, is a symptom of many diseases and disorders
- The most common causes are the overuse or over-stretching of a muscle or group of muscles
- Myalgia without a traumatic history is often due to viral infections
- Longer-term myalgias may be indicative of a metabolic myopathy, some nutritional deficiencies or chronic fatigue syndrome



https://en.wikipedia.org/wiki/Myalgia http://www.central-health.com/wp-content/uploads/blog/poly-myalgia.jpg

Interviewing of the patient: complaints (bone pain)

- Bone pain is pain coming from the bone
- It occurs as a result of a wide range of diseases and/or physical conditions and may severely impair the quality of life for patients who suffer from it
- Bone pain belongs to the class of deep somatic pain, often experienced as a dull pain that cannot be localized accurately by the patient
- Bone pain can have several possible causes ranging from extensive physical stress to serious diseases such as tumor, chronic infection, avascular necrosis, etc.

https://en.wikipedia.org/wiki/Bone_pain https://edc2.healthtap.com/ht-staging/user_answer/avatars/379422/large/open-uri20120830-27966-1ldgcne.jpeg?1386607959

Interviewing of the patient: complaints (joint stiffness)

- Joint stiffness may be either the symptom of pain on moving a joint, the symptom of loss of range of motion or the physical sign of reduced range of motion after a period of rest
- Pain on movement is commonly caused by osteoarthritis, often in quite minor degrees, and other forms of arthritis, or overuse and rarely by more complex causes of pain such as infection or neoplasm
- "Morning stiffness" pain which eases up after the joint has been used, is characteristic of rheumatoid arthritis
- The patient notices that the joint (or many joints) do not move as far as they used to or need to
- Loss of motion is a feature of more advanced stages of arthritis including osteoarthritis, rheumatoid arthritis and ankylosing spondylitis

https://en.wikipedia.org/wiki/Joint_stiffness

Interviewing of the patient: complaints (joint swelling)

- Joint swelling is the buildup of fluid in the soft tissue surrounding the joint
- Joint swelling may occur along with joint pain
- The swelling may cause the joint to appear larger or abnormally shaped
- Joint swelling can cause pain or stiffness
- After an injury, swelling of the joint may mean you have a broken bone or a tear in the muscle tendon or ligament
- Many different types of arthritis may cause swelling, redness, or warmth around the joint
- An infection in the joint can cause swelling, pain, and fever

Gout

http://www.nlm.nih.gov/medlineplus/ency/article/003262.htm http://medpic.org/picture/6/joint_swelling.jpg

Interviewing of the patient: complaints (ankylosis)

- Ankylosis or anchylosis is a stiffness of a joint due to abnormal adhesion and rigidity of the bones of the joint, which may be the result of injury or disease
- The rigidity may be complete or partial and may be due to inflammation of the tendinous or muscular structures outside the joint or of the tissues of the joint itself
- "Ankylosis" is also used as an anatomical term, bones being said to ankylose (or anchylose) when, from being originally distinct, they coalesce, or become so joined together that no motion can take place between them

Rheumatoid knee, ankylosis

http://www.nlm.nih.gov/medlineplus/ency/article/003262.htm http://medpic.org/picture/6/joint_swelling.jpg

Interviewing of the patient: complaints (muscle weakness)

- Muscle weakness or myasthenia is a lack of muscle strength
- The causes are many and can be divided into conditions that have either true or perceived muscle weakness
- True muscle weakness is a primary symptom of a variety of skeletal muscle diseases, including muscular dystrophy and inflammatory myopathy.
- It occurs in neuromuscular junction disorders, such as myasthenia gravis
- Muscle weakness can also be caused by low levels of potassium and other electrolytes within muscle cells

A child with spinal muscular atrophy type

http://img.medscape.com/article/775/660/775660-figure.jpg http://www.nlm.nih.gov/medlineplus/ency/article/003262.htm
http://medpic.org/picture/6/joint_swelling.jpg

Interviewing of the patient: complaints (limited range of motion)

- Limited range of motion refers to a joint that has a reduction in its ability to move
- The reduced motion may be a mechanical problem with the specific joint or it may be caused by injury or diseases such as osteoarthritis, rheumatoid arthritis, or other types of arthritis
- Pain, swelling, and stiffness associated with arthritis can limit the range of motion of a particular joint and impair function and the ability to perform usual daily activities

Child with crutches

https://en.wikipedia.org/wiki/Range_of_motion

Interviewing of the patient: complaints (bone fractures)

- A bone fracture (sometimes abbreviated FRX or Fx, F_x, or #) is a medical condition in which there is a break in the continuity of the bone
- A bone fracture can be the result of high force impact or stress, or a minimal trauma injury as a result of certain medical conditions that weaken the bones, such as osteoporosis, bone cancer, or osteogenesis imperfecta, where the fracture is then properly termed a pathologic fracture

Primary lymphoma of humerus: pathologic fracture

https://en.wikipedia.org/wiki/Bone_fracture

Interviewing of the patient: complaints
(a butterfly-shaped rash on the cheeks and bridge of the nose)

- A butterfly rash is a rash that takes the shape of a butterfly
- Known more formally as a ‘malar rash’, a butterfly rash is most commonly associated with the autoimmune disease lupus, though it can also be present in other conditions and particularly other autoimmune conditions
- Identifying a butterfly rash is an important way then to diagnose cases of lupus, and at the same time it is useful to understand how to treat it and how you can manage it

http://www.healthguidance.org/entry/15902/1/What-Is-a-Butterfly-Rash.html
http://img.webmd.com/dtmcms/live/webmd/consumer_assets/site_images/articles/health_tools/lupus_overview_slideshow/dermnet_rf_photo_of_butterfly_rash.jp

Interviewing of the patient: complaints (sensitivity to sunlight)

- Photosensitivity, sometimes referred to as a sun allergy, is an immune system reaction that is triggered by sunlight
- Photosensitivity reactions include solar urticaria, chemical photosensitization, and polymorphous light eruption and are usually characterized by an itchy eruption on patches of sun-exposed skin
- People may inherit a tendency to develop these reactions
- Certain diseases, such as systemic lupus erythematosus and some porphyrias, also may cause more serious skin reactions to sunlight

Red skin rash

http://www.merckmanuals.com/home/skin-disorders/sunlight-and-skin-damage/photosensitivity-reactions http://s.hswstatic.com/gif/allergic-to-the-sun-1.jpg

Interviewing of the patient: complaints (hair loss)

- Hair loss (alopecia, baldness) is a loss of hair from the head or body
- Baldness can refer to general hair loss or male pattern hair loss
- Some types of hair loss can be caused by alopecia areata, an autoimmune disorder
- The extreme forms of alopecia areata are alopecia totalis, which involves the loss of all head hair, and alopecia universalis, which involves the loss of all hair from the head and the body
- Hair loss and hypotrichosis can have many causes, including fungal infection, traumatic damage, as a result of radiotherapy or chemotherapy, and as a result of nutritional deficiencies such as iron deficiency

https://en.wikipedia.org/wiki/Hair_loss

Interviewing of the patient: complaints (malaise)

- Malaise is a feeling of general discomfort or uneasiness, of being "out of sorts", often the first indication of an infection or other disease
- Malaise is a non-specific symptom and can present in the slightest ailment, such as an emotion (causing fainting, a vasovagal response) or hunger (light hypoglycemia), to the most serious conditions (cancer, stroke, heart attack, internal bleeding, etc.)
- Malaise expresses a patient's uneasiness that "something is not right" that may need a medical examination to determine the significance

https://en.wikipedia.org/wiki/Malaise https://edc2.healthtap.com/ht-staging/user_answer/avatars/452519/large/open-uri20121020-2596-10ukq43.jpeg?1386597722

Interviewing of the patient: complaints (cold and numb fingers or toes)

- Cold and numb fingers or toes (Raynaud's syndrome or disease), is a disorder of blood circulation in the fingers and toes (and less commonly of the ears and nose)
- Exposure to cold abnormally reduces blood circulation causing the skin to become pale, waxy-white or purple.
- The disorder is sometimes called "white finger", "wax finger" or "dead finger"
- It is most commonly associated with "hand-arm vibration syndrome" but it is also involved in other occupational and autoimmune diseases
-

http://www.ccohs.ca/oshanswers/diseases/raynaud.html http://www.hyperhidrosis-usa.com/raynauds.html

Interviewing of the patient: complaints (swollen fingers or hands)

- Swollen fingers or hands is a sign of fluid buildup or inflammation of the tissues or joints of the hand
- Hand swelling, which is also called hand edema, can also result from serious infections, trauma, and other abnormal processes.
- Chronic hand swelling, or swelling that builds up over time, often indicates an inflammatory process, such as arthritis
- Hand swelling can also be caused by orthopedic conditions, such as a bone fracture or a cast that is too tight warmth

http://www.healthgrades.com/symptoms/hand-swelling http://img.medscape.com/pi/features/slideshow-slide/knuckles/fig2.jpg

Interviewing of the patient: complaints (rash)

- A rash is a change of the skin which affects its color, appearance, or texture
- A rash may be localized in one part of the body, or affect all the skin
- Rashes may cause the skin to change color, itch, become warm, bumpy, chapped, dry, cracked or blistered, swell, and may be painful
- Causes of rashes: allergies, for example to food, dyes, medicines, insect stings, metals such as zinc or nickel; reaction to vaccination; skin diseases such as eczema or acne, exposure to sun (sunburn) or heat; friction due to chafing of the skin; irritation such as caused by abrasives impregnated in clothing rubbing the skin; secondary syphilis; poor personal hygiene; autoimmune disorders such as psoriasis; Lyme disease, etc.

http://www.healthgrades.com/symptoms/hand-swelling http://img.medscape.com/pi/features/slideshow-slide/knuckles/fig2.jpg

Interviewing of the patient: complaints (shortness of breath)

- Most cases of shortness of breath are due to heart or lung conditions
- Other problems: anemia, broken ribs, generalized anxiety disorder , myasthenia gravis, atc.

http://www.healthgrades.com/symptoms/hand-swelling http://images.onlymyhealth.com/imported/images/2014/October/15_Oct_2014/shortness.jpg

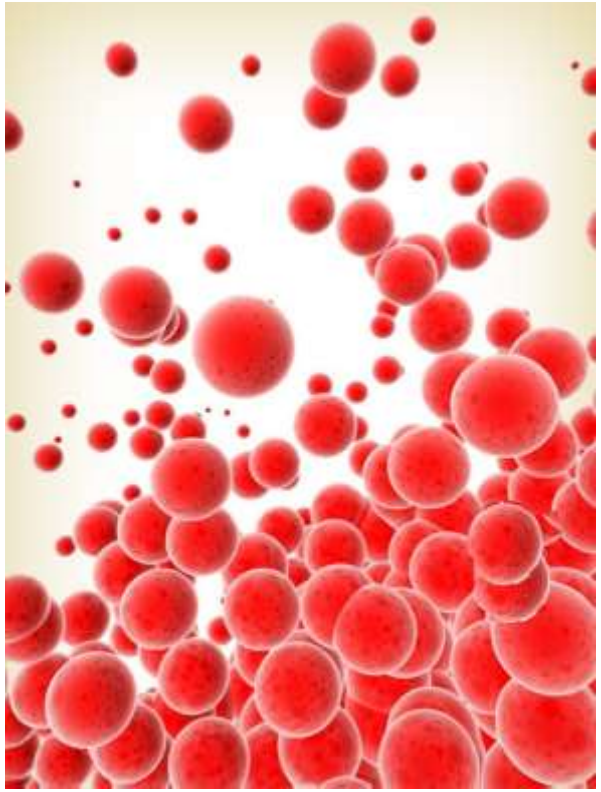
Interviewing of the patient: complaints (fever)

- Fever (pyrexia, febrile response), is defined as having a temperature above the normal range due to an increase in the body's temperature set-point
- A fever can be caused by many medical conditions ranging from the not serious to potentially serious (viral, bacterial, and parasitic infections , autoimmune connective tissue diseases, etc.)

https://en.wikipedia.org/wiki/Fever http://www.naturalremedies.org/images/hay-fever-2.jpg

Interviewing of the patient: complaints (anemia)

- Anemia is usually defined as a decrease in the amount of red blood cells (RBCs) or hemoglobin in the blood
- There are three main types of anemia, that due to blood loss, that due to decreased red blood cell production, and that due to increased red blood cell breakdown (hemolysis)
- The main cause of blood loss is bleeding due to trauma, gastrointestinal disorders (ulcer, cancer)
- Causes of decreased production include autoimmune connective tissue diseases, thalassemia, marrow invasion by leukemia, lymphoma, metastatic tumor, etc.



https://en.wikipedia.org/wiki/Anemia http://obatalternatifpenyakit.com/wp-content/uploads/2012/09/anemia-aplastik.jpg

Interviewing of the patient: complaints (weight loss)

- Weight loss refers to a reduction of the total body mass, due to a mean loss of fluid, body fat or adipose tissue and/or lean mass, namely bone mineral deposits, muscle, tendon, and other connective tissue
- Weight loss can either occur unintentionally due to malnourishment or an underlying disease or arise from a conscious effort to improve an actual or perceived overweight or obese state
- "Unexplained" weight loss that is not caused by reduction in calorific intake or exercise is called cachexia and may be a symptom of a serious medical condition
- Serious weight loss may reduce quality of life, impair treatment effectiveness or recovery, worsen disease processes and be a risk factor for high mortality rates

https://en.wikipedia.org/wiki/Weight_loss

Interviewing of the patient: complaints (deformity)

- A deformity, dysmorphism, or dysmorphic feature is a major difference in the shape of a body part or organ compared to the average shape of that part
- Causes: genetic mutation, damage to the fetus or uterus, complications at birth, a growth or hormone disorder, reconstructive surgery following a severe injury, arthritis and other rheumatoid disorders, chronic paresis, paralysis or muscle imbalance, atc.

Jaccoud's arthropathy

https://en.wikipedia.org/wiki/Deformity http://images.rheumatology.org/image_dir/album75695/md_04-06-0173.jpg

Interviewing of the patient: specific questions for set of complaints

Each of complaints will prompt a series of specific questions that will help arrive at a preliminary single diagnosis, or a group of different diagnoses

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Interviewing of the patient: example of specific questions in complaint

- Character
- Location
- Severity
- Timing
- Duration
- Radiation
- Provocation
- Relieving conditions
- When did it first start?
- How often does it occur?
- Is it becoming more frequent with time?
- Were there associated symptoms
- Are the symptoms lasting longer?
- How the symptoms relate to food intake?

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Interviewing of the patient: past medical history

In a medical encounter, a past medical history (abbreviated PMH), is the total sum of a patient's health status prior to the presenting problem

http://www.pedsendony.com/img/medical-forms.jpg https://en.wikipedia.org/wiki/Past_medical_history

Interviewing of the patient: prior or current treatment

- Any constantly used medications
- Previous surgery
- Injections
- Chiropractic
- Exercise/PT (Physical Therapy)
- ER (Emergency Room)
- Massage therapy

An ancient Greek patient gets medical treatment:
this aryballos (circa 480–470 BCE, now in Paris's Louvre Museum) probably contained healing oil

http://www.sgh.com.sg/Clinical-Departments-Centers/Urology/Patient-Education/PublishingImages/pe_bph04.jpg

Interviewing of the patient: any constantly used medications

- Drugs prescribed for diabetes mellitus, hypertension, cardiac disorders, hormonal disorders, cancer, arthritis, immunopathological processes, psychiatric disorders, etc.

http://www.bestacnetreatment4all.com/wp-content/uploads/images/2011/acne-treatment-strongest.jpg

Interviewing of the patient: previous treatment and present status

- Previous Treatment
  - What?
  - Where?
  - When?
  - By whom?
- Present Status
  - Better vs. same vs. worse

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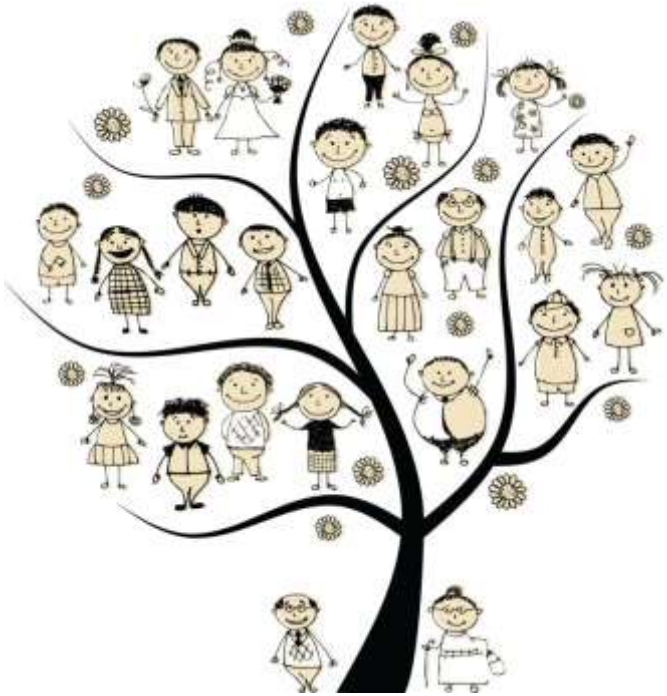
http://www.kuhp.kyoto-u.ac.jp/english/department/clinical/images/surgery_gastro.jpg

Interviewing of the patient: family history and genetic risk

- Certain of the musculoskeletal system and connective tissue diseases may occur in more than one member of a family
- The physician will inquire about the health of the patient's parents, brothers, sisters and children
- A family history of the musculoskeletal system and connective tissue diseases may be relevant to the underlying problem



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http://www.johngraycentre.org/wp-content/uploads/2013/06/family-tree-cartoon.jpg

Interviewing of the patient: social history

- High-risk behaviors
  - Alcohol, tobacco, or drug abuse
  - Depression
  - Violence
  - Sedentary lifestyle
  - Previous joint injury while playing a sport
  - Work-related ergonomic risk factors (high task repetition, high force and/or awkward postures)
  - Obesity
  - Age
  - Sex (Fem - rheumatoid arthritis, lupus, Males – gout)

- Signs of any of the above behaviors may warrant referral to a secondary provider

http://yabluchanskiy.com/klinicheskaya-praktika/approach-to-the-patient-with-disease-of-the-cardiovascular-system-podxod-k-pacientu-s-zabolevaniem-serdechno-sosudistoj-sistemy/
http://www.lifespanfitness.com/media/articles/health/xsitting-disease-sedentary-lifestyle-infographic.jpg.pagespeed.ic.U8R4v0nfFF.jpg

Interviewing of the patient: why take a medical history?

- Up to 90% of conditions can be accurately diagnosed or recognized by conducting a thorough medical history and listening carefully to the patient's response(s)
- It determines the necessary tests and measures you should prioritize for pt's objective examination

http://si.wsj.net/public/resources/images/HE-AA132_PRIVAC_J_20150625121323.jpg

Interviewing of the patient: review of systems

- The "laundry list" of symptoms related to various organs of the body
- A series of questions helps seek out information that the patient may have neglected to provide the physician
- Review of systems helps to identify the patient's problem, or exclude different parts of the differential diagnosis

eplabdigest.com/files/templespot6.png heartsite.com/html/history.html
http://www.medicine.uiowa.edu/uploadedImages/Education/MD/Content/Teaching_and_Learning/Assessing_Clinical_Skills/student%20doctor%20and%20patient%20003%20(2).jpg

Interviewing of the patient: systemic enquiry

- General: fever, weight loss, loss of appetite, lethargy
- Respiratory and cardiovascular systems: shortness of breath, cough, hemoptysis, wheeze, chest pain
- Gastrointestinal system: nausea and vomiting, hematemesis, dysphagia, heartburn, jaundice, abdominal pain, change in bowel habit, rectal bleeding, tenesmus (sensation of incomplete bowel emptying)
- Genito-urinary system: dysuria (pain on passing urine), frequency, terminal dribbling, urethral discharge
- Gynecological system: pelvic pain, vaginal bleeding, vaginal discharge, LMP
- Neurological system: headaches, dizziness, loss of consciousness, fits, faints, funny turns, numbness, tingling, weakness, problems speaking, change in vision

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Interviewing of the patient:
Musculoskeletal System and Connective Tissue Diseases Quality of Life Indexes

- The Musculoskeletal System and Connective Tissue Diseases Quality of Life Indexes are a questionnaires which measures Quality of Life of these type of patients
- Indexes are multidimensional constructs with several dimensions: emotional or psychological well being, physical functioning, social functioning, and symptoms of the disease and treatment
- A single item that identifies perceived change in health is also included, making the Indexes useful in measuring of changes in Musculoskeletal System and Connective Tissue Diseases Quality of Life Indexes over time and treatment

http://www.ncbi.nlm.nih.gov/pubmed/16987837

Physical examination of the patient: general inspection

- Whether patient is comfortable at rest
- Are there any gross abnormalities
- Are there any obvious patient' skin changes
- Observe gait, and note any awkwardness in rhythm, weight shifting, or imbalance
- Inspect muscles for hypertrophy and atrophy, and note areas of ecchymoses which point to previous trauma
- Note any bone bowing, angulation, or tumor
- Inspect visceral organs and systems for inflammation and functional deviations
- Are there any obvious medical appliances

Parkinsonian Gait

https://www2.le.ac.uk/departments/msce/existing/clinical-exam/documents/GI%20examination%20text.pdf http://www.osceskills.com/e-learning/subjects/abdominal-examination/

Physical examination of the patient: the classical "look - feel - move" approach

- This approach is the most useful one in localizing the pathology
- This requires differentiating between articular versus extraarticular source
- Every joint should be assessed individually, and the soft tissue, contractile structures around the joint appropriately examined

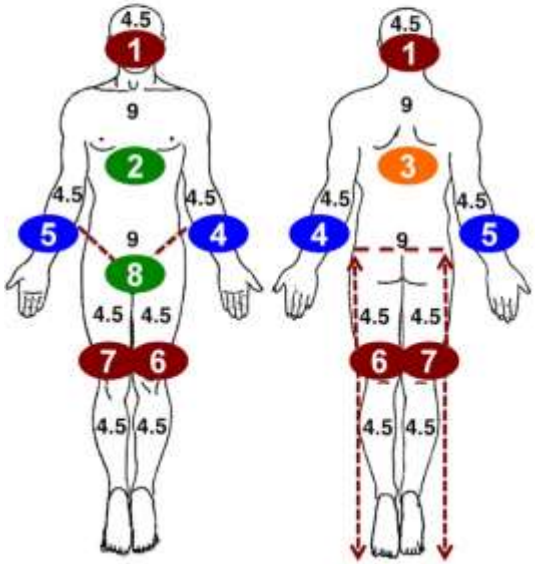
Joint	Primary movement
Wrist	Flexion / Extension
Elbow	Flexion / Extension
Shoulder	Abduction / External Rotation
Neck	All movement except flexion
Thoracic	Extension
Lumbar	Lateral flexion / Flexion
Hips	Flexion / Internal rotation
Knees	Flexion
Ankle	Plantar flexion
Subtalar	Varus

http://www.arthritis.co.za/the%20clinical%20examination%20technique.html

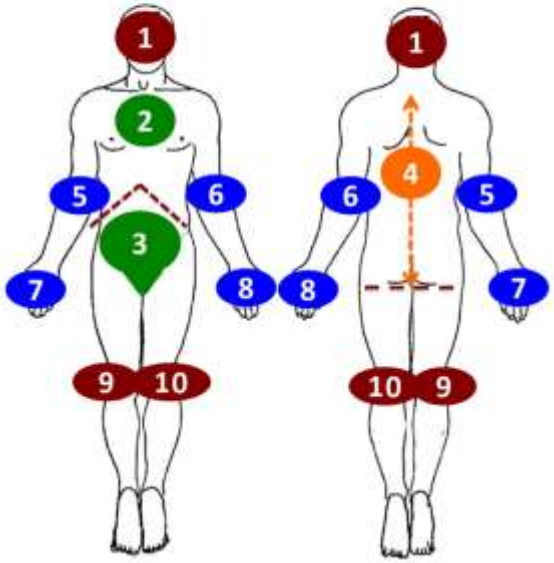
Physical examination of the patient: the classical "look - feel - move" approach: look

- Gait
- Swelling
- Redness in joints or tendons
- Skin changes (examine for psoriasis, Raynaud's phenomenon, ulceration of skin and rashes)
- Wasting of regional muscles
- Deformity or contracture

NIH Assessment uses
Rule of 9s
8 body areas



Vienna Skin Score
10 body areas



http://www.arthritis.co.za/the%20clinical%20examination%20technique.html http://www.bloodjournal.org/content/bloodjournal/118/10/2679/F4.large.jpg?sso-checked=true

Physical examination of the patient: the classical "look - feel - move" approach: feel

- Palpate the margins of each joint
- Synovial thickening is felt as a "soft spongy" texture with the additional presence of fluid identified by fluctuant swelling
- Each joint is palpated in turn and presence or absence of synovial thickening is recorded

Exerts pressure with one thumb and then the other to ballot for increased joint fluid

http://www.arthritis.co.za/the%20clinical%20examination%20technique.html http://www.rheumatologynetwork.com/sites/default/files/rm/1815175.png

Physical examination of the patient: the classical "look - feel - move" approach: move

- Active movement: the patient utilizes his own muscles and contractile structures to move a particular joint through its range of movement
- Passive movement: the patient is encouraged to relax and the examiner moves the joint through its accepted range of movement
- Resisted movement: this isolates the cause to a particular tendon or bursa, the joint is made to relax then force is applied by the patient against resistance of the examiner

http://www.arthritis.co.za/the%20clinical%20examination%20technique.html http://www.arthritis.co.za/images/subtalar%20examination.jpg

Physical examination of the patient:
summary of information seen on musculoskeletal examination

- Skin: color change, consistency, sweating or coldness, eruptions, ulcerations
- Heat
- Soft tissue swelling: synovial thickening, periarticular swelling, nodules, effusion
- Wasting (atrophy, dystrophy, spasm, contracture)
- Tenderness to palpation and pain on motion
- Crepitation
- Deformity: abnormal angulation, subluxation
- Limitation of motion
- Stability
- Abnormalities of trunk and spine: scoliosis, kyphosis, limitation of motion
- Flexion (mostly easily documented by measuring lengthening): lateral flexion, rotation
- Ambulation: ability to ambulate with or without aids, gait

http://www.ncbi.nlm.nih.gov/books/NBK272/table/A4789/?report=objectonly

Physical examination of the patient: skin changes

Rheumatoid arthritis: vasculitis with small infarcts, fingers

The skin rashes of Churg-Strauss syndrome

Gout

http://images.rheumatology.org/image_dir/album75692/md_99-05-0038.tif.jpg
http://emedicine.medscape.com/article/331197-overview https://www.med.umich.edu/scleroderma/patients/i/raynaud1.jpg

Physical examination of the patient: soft tissue swelling

The swelling is a indicator of the degree of soft-tissue injury

An asymptomatic swelling on the dorsum of left hand

The swollen ankles

https://www2.aofoundation.org/wps/portal/surgery/ http://www.consultant360.com/sites/default/files/images/1205Con_DC_C3.jpg http://www.whatcausesthis.com/what-causes-swollen-ankles/ http://emedicine.medscape.com/article/331197-overview https://www.med.umich.edu/scleroderma/patients/i/raynaud1.jpg

Physical examination of the patient: soft tissue swelling

Muscle Atrophy

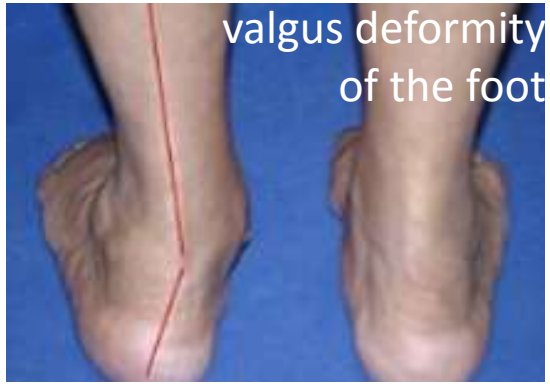
Myotonic dystrophy

Muscle spasm

Severe dorsal contracture

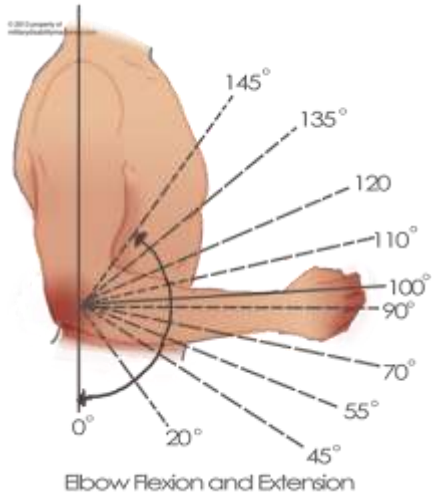
http://www.jamesgrigg.co.uk/wp-content/uploads/2013/03/back_muscle_spasms_954_x.png http://www.coreconcepts.com.sg/mcr/wp-content/uploads/2009/08/muscleatrophy.jpg
http://www.ijps.org/articles/2011/44/1/images/ijps_2011_44_1_59_81438_u2.jpg https://upload.wikimedia.org/wikipedia/commons/9/95/Myotonic_dystrophy_patient.JPG

Physical examination of the patient: deformity



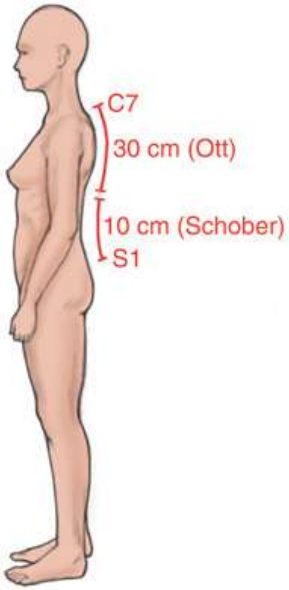
http://michelleprice.ca/prevenir-les-blessures-occasionnees-par-la-course/ http://1.bp.blogspot.com/-0l7YT_aHVy4/TlYPSGe9i4I/AAAAAAAABtY/qVfiVSF9GKc/s1600/Spine+Disorders+-+KL.jpg
http://1.bp.blogspot.com/-F4gn4SFeJds/UBnVrCyZiDI/AAAAAAAAAG4/hiKpS1H8gSw/s1600/Nursing%2BAssessment%2Bfor%2BScoliosis.jpg

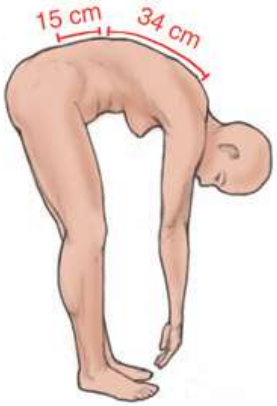
Physical examination of the patient: limitation of motion



Elbow flection and extension

Fingers motion



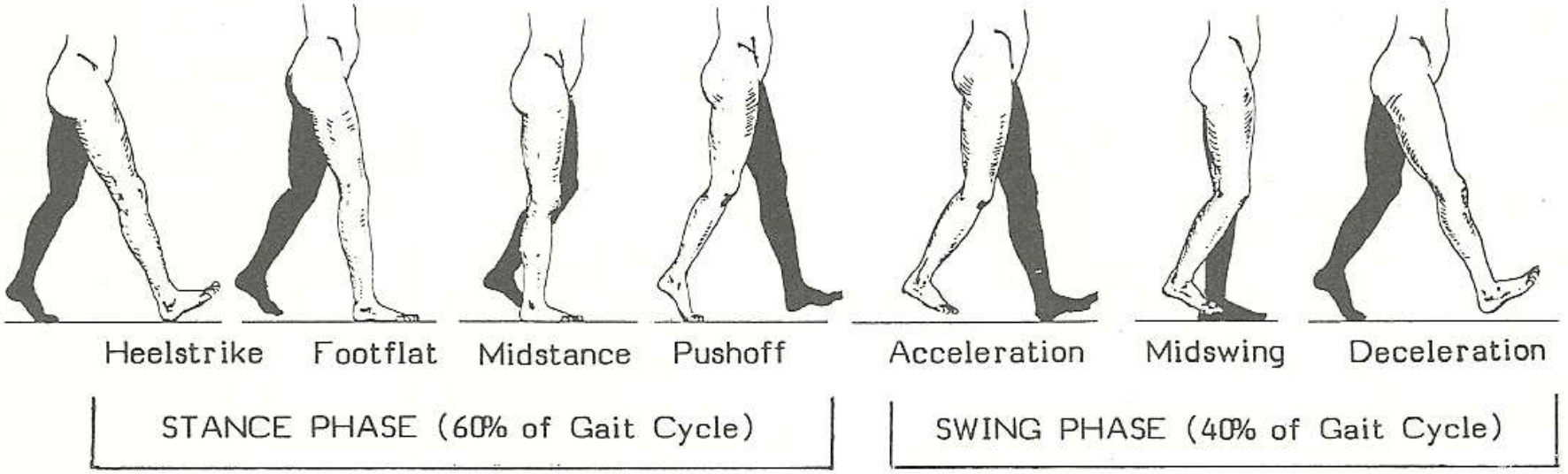


Schober's and Ott's signs

Limited spine motion

http://images.rheumatology.org/image_dir/album75694/md_99-07-0013.tif.jpg
http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/rheumatology/ankylosing-spondylitis/images/figure-1.jpg
http://harms-spinesurgery.com/src/plugin.php?m=harms.2690.preview&t=file&nocache=1&ism=off&lang=ru http://militarydisabilitymadeeasy.com/images/elbow/elbow%20motion%204.png

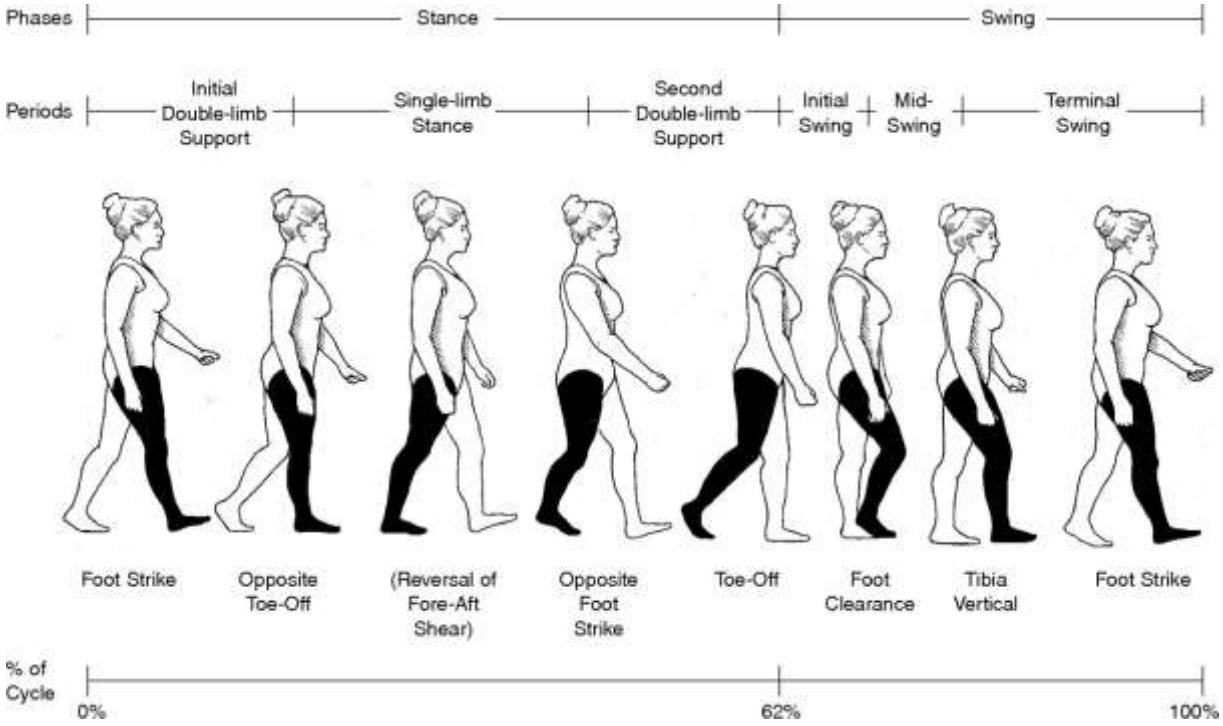
Physical examination of the patient: normal walking



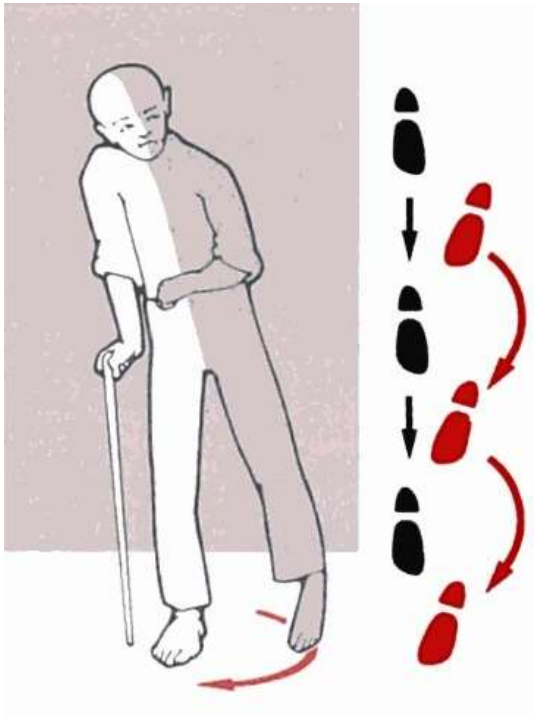
- Watch the patient walk: there should be symmetry and smoothness of movement and arm swing with no pelvic tilt and normal stride length
- The patient should be able to start, stop and turn quickly

http://www.chiro.org/ACAPress/Body_Alignment_Figure19.jpg

Physical examination of the patient: examples of gait deviations



Evaluation of the Elderly Patient With an Abnormal Gait



Gait of a hemiplegic patient

https://www.jaaos.org/content/15/2/107/F1.large.jpg https://s-media-cache-ak0.pinimg.com/736x/dd/44/16/dd441654f72c225471756a30de05417a.jpg

Physical examination of the patient: Raynaud phenomenon

- Raynaud phenomenon manifests as recurrent vasospasm of the fingers and toes and usually occurs in response to stress or cold exposure
- Secondary Raynaud phenomenon should be distinguished from primary Raynaud phenomenon (Raynaud disease)
- Diagnostic criteria for primary Raynaud phenomenon:
  - Attacks triggered by exposure to cold and/or stress
  - Symmetric bilateral involvement
  - Absence of necrosis
  - Absence of a detectable underlying cause
  - Normal capillaroscopy findings
  - Normal laboratory findings for inflammation
  - Absence of antinuclear factors

http://emedicine.medscape.com/article/331197-overview https://www.med.umich.edu/scleroderma/patients/i/raynaud1.jpg

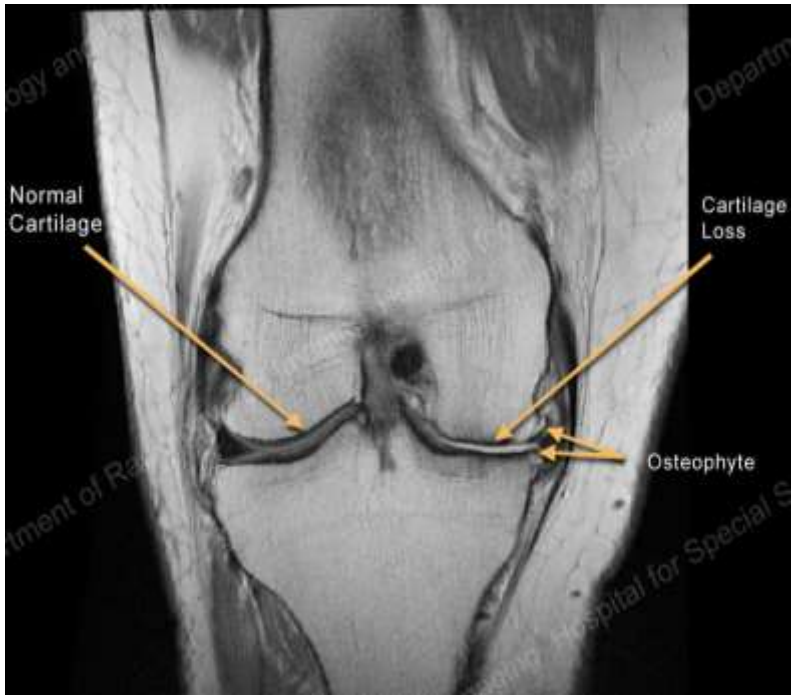
Instrumental methods: imaging studies

- Imaging studies are often unnecessary. Plain x-rays in particular reveal mainly bony abnormalities, and most joint disorders do not affect bone primarily. However, imaging may help in the initial evaluation of relatively localized, unexplained, persistent or severe joint and particularly spine abnormalities; it may reveal primary or metastatic tumors, osteomyelitis, bone infarctions, periarticular calcifications (as in calcific tendinitis), or other changes in deep structures that may escape physical examination. If chronic RA, gout, or osteoarthritis is suspected, erosions, cysts, and joint space narrowing with osteophytes may be visible. In pseudogout, Ca pyrophosphate deposition may be visible in intra-articular cartilage.
- For musculoskeletal imaging, plain x-rays may be obtained first, but they are often less sensitive, particularly during early disease, than MRI, CT, or ultrasonography. MRI is the most accurate study for fractures not visible on plain x-rays, particularly in the hip and pelvis, and for soft tissues and internal derangements of the knee. CT is useful if MRI is contraindicated or unavailable. Ultrasonography, arthrography, and bone scanning may help in certain conditions, as can biopsy of bone, synovium, or other tissues.

http://www.merckmanuals.com/professional/musculoskeletal-and-connective-tissue-disorders/approach-to-the-patient-with-joint-disease/evaluation-of-the-patient-with-joint-disorders

Instrumental methods: magnetic resonance imaging (MRI)

A sharply marginated bone lesion in a juxta-articular location typically seen in inflammatory arthritis



A sharply marginated bone lesion in a juxta-articular location typically seen in inflammatory arthritis

Chronic Tendinitis

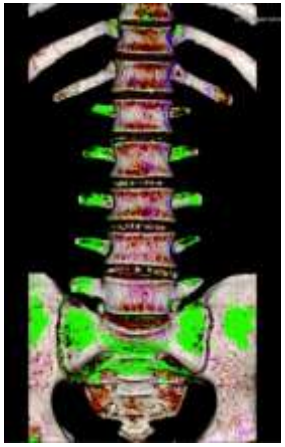
http://www.hss.edu/images/corporate/OA_NormalCartilage_800x800.jpg http://www.rheumatologynetwork.com/sites/default/files/rm/1495302.png

Instrumental methods: computed tomography (CT)

Three-dimensional volume-rendered image showing crystal deposition (green) at sites throughout the feet

Interstitial lung diseases in collagen vascular disease

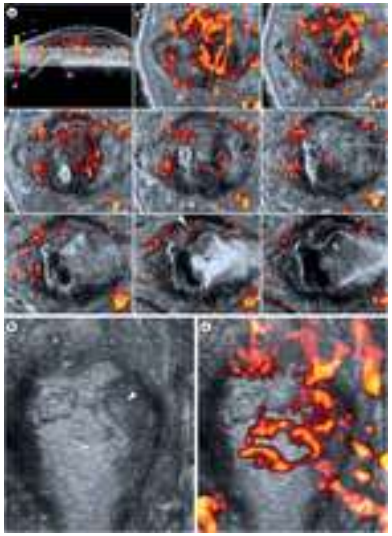
spinal fracture in diffuse idiopathic skeletal hyperostosis



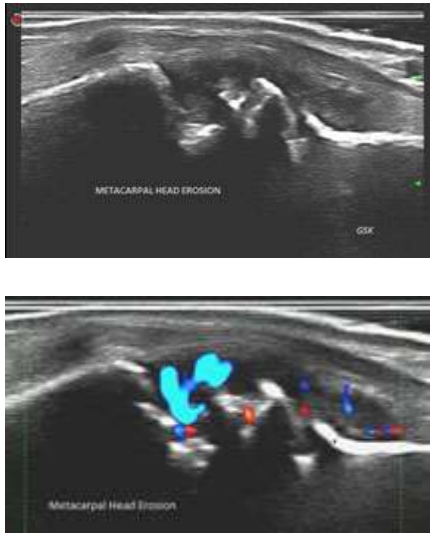
Dual-energy CT in evaluation of axial gout

http://www.hss.edu/images/corporate/OA_NormalCartilage_800x800.jpg http://www.rheumatologynetwork.com/sites/default/files/rm/1495302.png
http://www.blackwellpublishing.com/acrmeeting/abstract.asp?MeetingID=799&id=107581

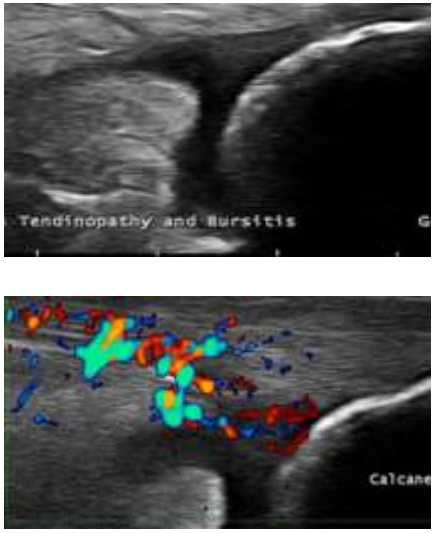
Instrumental methods: ultrasonography



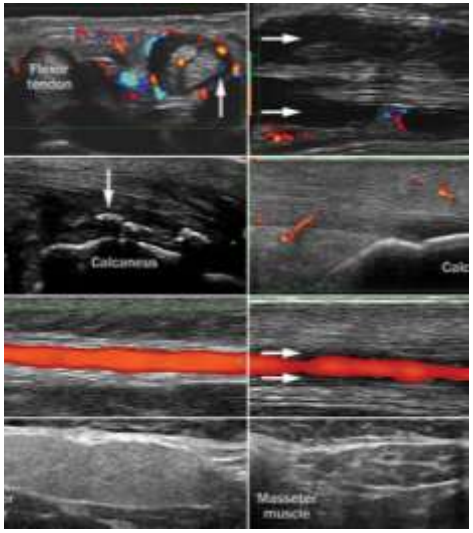
Representative images of rheumatoid arthritis



Active synovitis overlying a large metacarpal head erosion



Achilles tendinopathy and retrocalcaneal bursitis

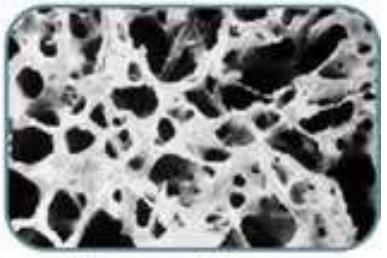


Inflammatory rheumatic disease

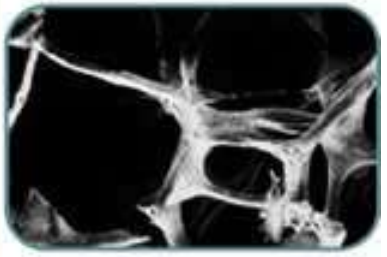
http://www.nature.com/nrrheum/journal/v10/n10/carousel/nrrheum.2014.145-f1.jpg
http://www.nature.com/nrrheum/journal/v7/n8/fig_tab/nrrheum.2011.95_F3.html http://www.arthritisandpainclinic.com/ultrasound.html

Instrumental methods: bone densitometry

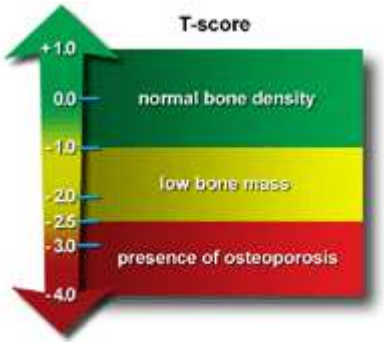
- Bone density is a medical term normally referring to the amount of mineral matter per square centimeter of bones
- Bone density is used as an indirect indicator of osteoporosis and fracture risk
- Bone density is measured by a densitometry, performed in the radiology departments of hospitals
- Measurements are most commonly made over the lumbar spine and over the upper part of the hip
- The forearm may be scanned if the hip and lumbar spine are not accessible

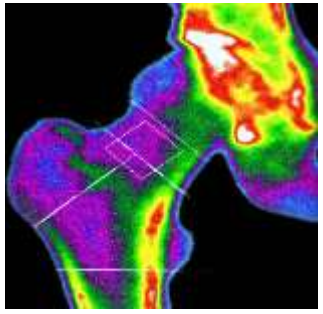


Normal Bone



Osteoporotic Bone

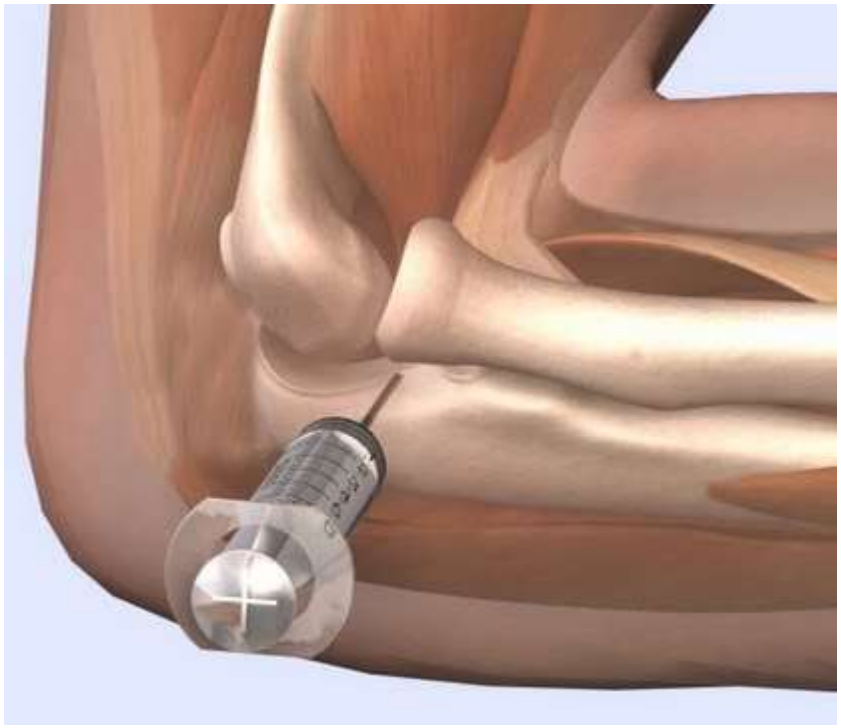




http://www.thesurreyparkclinic.co.uk/uploads/images/bone-density-scan.jpg https://en.wikipedia.org/wiki/Bone_density
https://www.urmc.rochester.edu/Encyclopedia/GetImage.aspx?ImageID=125689

Instrumental methods: arthrocentesis

- Arthrocentesis is the process of puncturing the joint with a needle to withdraw fluid
- If there is an effusion and arthrocentesis is done correctly, fluid can typically be withdrawn
- Examination of synovial fluid is the most accurate way to exclude infection, diagnose crystal-induced arthritis, and otherwise determine the cause of joint effusions
- This procedure is indicated for all patients with acute or unexplained monarticular joint effusions and for patients with unexplained polyarticular effusions



Arthrocentesis method: elbow

http://www.merckmanuals.com/professional/musculoskeletal-and-connective-tissue-disorders/approach-to-the-patient-with-joint-disease/evaluation-of-the-patient-with-joint-disorders

http://tutorialsfactory.com/uploads/arthrocentesis-method-elbow-4169.jpg

Instrumental methods: synovial fluid examination

	WBC/mm³	Color	Viscosity
Normal	< 150	Colorless/Straw	High
Noninflammatory	< 3,000	Straw/Yellow	High
Inflammatory	> 3,000	Yellow	Low
Septic (purulent)	> 50,000	Pus/Mixed	Mixed
Hemorrhagic	Similar to blood	Red	Low

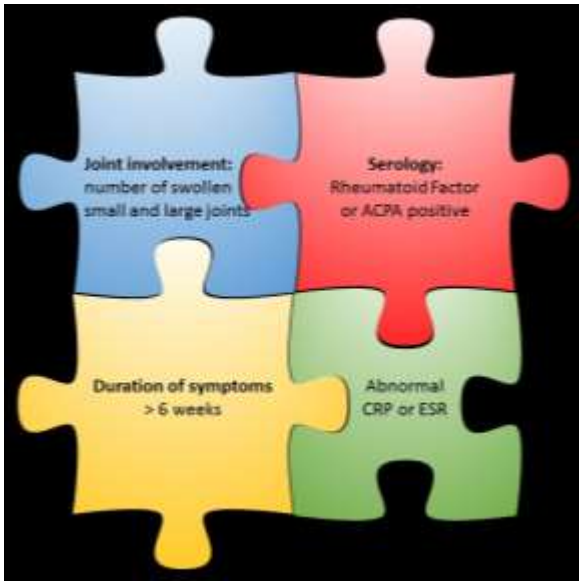
- At the bedside, gross characteristics of the fluid are assessed, such as its color and clarity (noninflammatory, inflammatory, infectious, hemorrhagic)
- Laboratory tests commonly done on joint fluid include cell count, leukocyte differential, Gram stain and culture (if infection is a concern), and wet drop examination for cells and crystals
- Microscopic examination (definitive diagnosis of gout, pseudogout, and other crystal-induced arthritides)

http://www.merckmanuals.com/professional/musculoskeletal-and-connective-tissue-disorders/approach-to-the-patient-with-joint-disease/evaluation-of-the-patient-with-joint-disorders

http://3bb59dce5506584d6e1f-fb29dfb4e6851bd17c71dfbd9fa646fd.r61.cf1.rackcdn.com/1779/content_table_-_synovial_fluid_analysis_arthrocentesis.jpg

laboratory methods: Blood Tests

- Antinuclear antibodies (ANA) and anti–double-stranded DNA antibodies in SLE
- Rheumatoid factor and anti-cyclic citrullinated peptide (anti-CCP) antibodies in RA
- HLA-B27 in spondyloarthropathy (e.g., with symptoms of inflammatory back pain and normal x-rays)
- Antineutrophil cytoplasmic antibodies (ANCA) in certain vasculitides (sometimes useful when systemic involvement is suspected)
- LE cells
- CBC (complete blood count)
- WBC count (not highly specific or sensitive)
- ESR (not highly specific or sensitive)
- C-reactive protein (not highly specific or sensitive)
- Creatinine



The jigsaw puzzle of rheumatoid arthritis classification

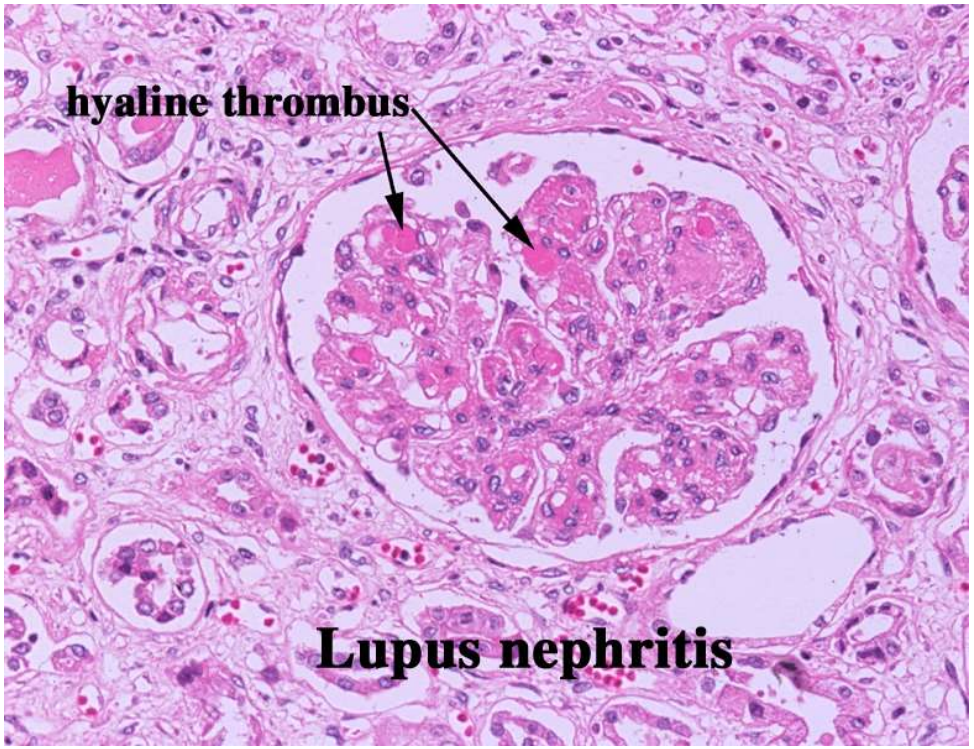
http://Creoskeletal-and-connective-tissue-disorders/approach-to-the-patient-with-joint-disease/evaluation-of-the-patient-with-joint-disorders

http://autoimmunityblog.com/wp-content/uploads/2015/04/Puzzle-ACR-Criteria.jpg

laboratory methods: urinalysis

Tests on glomerulonephritis associated with connective tissue disease:

- Red blood cells and red cell casts in urine
- White blood cells, a common indicator of infection or inflammation
- Increased protein, which may indicate nephron damage



http://www.mayoclinic.org/diseases-conditions/glomerulonephritis/basics/tests-diagnosis/con-20024691
https://kidneyfailureweb.files.wordpress.com/2013/11/lupus-kidney-disease.gif

Glossary of Patients Examination with Diseases of the Musculoskeletal System and Connective Tissue

Musculoskeletal System
and Connective Tissue Glossary of Terms